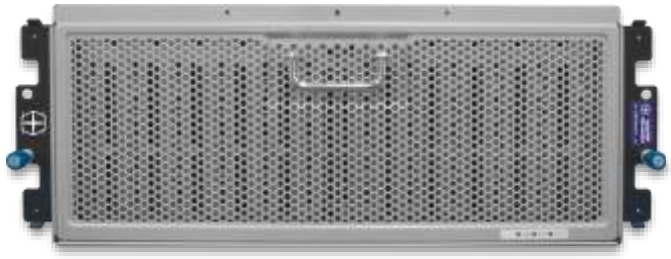
WARP Mechanics® WDS-9460 SAS-3 JBOD
Dense 12Gbps Storage Enclosure

Features & Benefits

- 60 integrated 3.5” drive modules
- Host connectivity 4x SAS SFF-8644 receptacles per IO Module
- Hot Swappable power & cooling modules, drive modules, and IO modules
- Up to 12Gbps SAS 3.0 per port
- SCSI Enclosure Services (SES-3) compliant

IT architects require much larger building blocks to meet modern data growth rates. To access giant data sets, storage must also be faster in IOPS and throughput. The WARP Mechanics WDS-9460 fills these needs in an efficient, cost-effective package.

With up to sixty 3.5” or 2.5” drives per 4U enclosure, this platform is an ultra-dense solution, fitting up to 720TB in just 4u of a standard 19” cabinet with high-capacity 12TB drives, or 120TB of enterprise high-performance SSD. That’s up to 7PB for a full cabinet.



The WDS-9460 Storage Enclosure is a high-density, scalable, and cost-effective design, offering 12Gbps SAS performance, high availability (HA), and hot-swappable components. The design is targeted towards data centers that need a dense solution with HA capabilities, while maintaining a low power profile.

The platform supports redundant 12Gbps SAS IO modules, allowing HA connections from hosts. It may connect to customer-provided servers via HD mini SAS cables, or act as an expansion enclosure for other WARP Mechanics products to support WARP*raid*, WARP*nas*, and WARP*hpc* services such as the WARP 30000/40000 series of high performance storage appliances.

With a total of four x4 12Gbps High Density SAS ports, each JBOD can deliver up to 384 Gbps: that’s 48 Gigabytes per second of throughput per chassis. Utilizing advanced 12TB drive modules, the WDS-9460 can scale to 7PB per datacenter rack, providing 20% more capacity while using 44% less power with 25% more reliability compared to other enclosures with the previous generation drives.

Wherever you and your company need to go, the WARP Mechanics portfolio can get you there, faster and more cost-efficiently than any other products in their class.

WARP Mechanics® WDS-9460 SAS-3 JBOD
Technical Specifications

Ordering Part Number and Product Name

WDS-9460-D42 ● WDS-9460 Gen2 Ultra-Dense JBOD

Scalability/Capacity

Up to 60 drive modules – 720 TB if using 12TB modules. Daisy chaining of enclosures for additional capacity will usually be limited by the SAS HBA or SAS RAID HBA used. Practical configurations of ~7PB on a single host are possible with some WARP servers. Selected WARP Mechanics system-level configurations have no known upper limit. (Zettabyte range.)

Throughput Performance

Theoretically, one chassis with two I/O modules supports 2x 4x 4x12Gb, or 384Gb/sec. half-duplex. (Full-duplex theoretical limit is higher.) *Practically*, bandwidth tends to be limited by the characteristics of the installed drive modules at a lower level.

Latency Performance

The SAS expanders in the I/O modules exhibit orders of magnitude lower latency than fast HDD or even SSD modules, and are a second order derivative with respect to IOPS.

Dual I/O Controllers

Redundant active/active JBOD I/O modules. Auto-negotiate data path speeds; in-band management; four 4x12Gb SAS 3.0 ports (SFF-8644) per controller.

Redundant Hot-Swap Components

- Two SAS-3 JBOD I/O controller modules
- Two advanced power and cooling modules (APC)
- Two independent AC power inlets
- Up to 60 3.5” drive modules adaptable to 2.5” carriers

Rackmount Enclosure

Height 174.8 mm (6.88 in.) – 4 Rack Units
Width 424 mm (16.69 in.)
Depth 983 mm (38.7 in.) – including cable management
Weight 93.71 kg (207.6 lbs.) – fully configured with 60 air HDDs
Weight without HDDs Single Shipping Pack: 56.8 kg (125 lbs.) max

Firmware/Software

WARP Mechanics controller firmware supports SCSI Enclosure Services (SES) 3.0 for in-band management. WARPware hosts include tools for managing firmware and advanced features.

Disk Drive Modules

60 independent 1.2 GB/s (12Gb) point-to-point connections to each SAS or SATA drive module with dual-port access and failover by each I/O controller to each drive. Form factor: 3.5” HDDs; 2.5” supported for SSDs via adapter.

Active Failure Notifications

In-band via SES-3, audible alarms for serious errors, and via LEDs

Maximum External Cable Length

Up to 10m. Within selected WARP end-to-end systems, longer distances are supported via SAS switches, or by using WARP*ware* storage clustering heads.

Host/Expansion Interfaces

Two SAS-3 I/O controller modules per chassis, each with four 4x12Gbps SAS-3 connections (48Gb per interface.)
HD Mini-SAS (SFF-8644) to HD Mini SAS (SFF-8644) cables can be used for host connections or for daisy-chaining up to four enclosures on a single path.

Monitoring and Reporting

Monitoring for temperature, advanced power and cooling modules including blower speed control, disk drives and I/O module(s). In-band reporting of all serial number, part number and revisions of each FRU and chassis via SES.

Warranty Information

Standard one year; up to three via normal renewable support; extended to five years in special circumstances for large installations. Contact WARP Mechanics sales to discuss special requirements.

AC Power

Two 1650W PSUs, hot-swap and redundant
200-240VAC auto-ranging, 47Hz-63Hz input (high line power only)
Compliant with 80 Plus efficiency Gold level
N+1 redundant fans (fans integrated in PSU)

Operating Environment

Temperature	5° to 35°C
Humidity	8% to 80% (non-condensing)
Shock	3.5g 6ms Pulse vertical shock
Vibration	Random 0.25 Grms, 5-10Hz
	0.05 g sine wave sweep, 10-300Hz
Acoustics	<7.5dB LwA @ 23ºC

Non-Operating Environment

Temperature	-30° to 60°C
Humidity	8% to 80% (non-condensing)
Shock	8g 6ms Trapezoidal
Vibration	Random 0.6 Grms 10-300Hz

Standards Compliance

This product has been tested and evaluated as Information Technology Equipment (ITE) at accredited third-party laboratories for all safety, emissions and immunity testing required for the countries and regions where the product is marketed and sold. The product has been verified as compliant with the latest applicable standards, regulations and directives for those regions/countries. The suitability of this product for other product categories other than ITE, may require further evaluation.